USDA ■ Forest Service
forest pest management methods application group
3825 East Mulberry
Fort Collins, CO 80524

April 1985 (20)

NEWSLETTER

A REMINDER

Although we have been at our present location for nearly a year now, we are still receiving lots of mail with our old Drake Park address. Our present mailing address is:

USDA Forest Service
FPM/MAG
3825 East Mulberry
Fort Collins, CO 80524

In addition, MAG, along with other Fort Collins based Forest Service units, has acquired a new "state of the art" telephone system. Our FTS and commercial prefixes, 323 and 224, respectively, are the same. New extensions for MAG staffers are:

Bill Ciesla ---------- 1788
Ellie Franz ---------- 1776
Jo Johnson ---------- 1775
Clay Lyon ---------- 1778
Mike Marsden ---------- 1728
Dick Myhre ---------- 1778
Sally Scrivner -------- 1785
Bill White ---------- 1777

The main office extension is 1785.

MORE ON IPIAS

Last November the IPIAS Steering Committee met and developed the direction for work in 1985. Briefly this consists of establishing a demonstration area on the Red River Ranger District of the Nezperce National Forest in Idaho where mountain pine beetle is beginning to reach epidemic levels in the lodgepole pine forests. Models, which are specific to the management concerns and objectives of this Forest, will be integrated to project the impacts of this epidemic.

One of the things that was revealed at this meeting was that the intent of IPIAS is still not fully understood. We have prepared a series of questions and answers to describe the objectives of this work and its present stage of development. We also plan to prepare a more detailed publication describing this work in the near future.

WHAT IS IPIAS?

IPIAS is the acronym for Integrated Pest Impact Assessment System. It is a decision support system designed to analyze and display the impacts of insects and/or disease on a number of forest resources including, timber, wildlife, recreation and scenic values, and water. IPIAS is also capable of displaying the consequences, both positive and negative, of alternative management actions on the pest, and in turn, the resource.

HOW IS IPIAS STRUCTURED?

IPIAS consists of a series of computer based pest and growth and

yield models which can be linked to socioeconomic models. This family of models is used to project change in resource output due to pest activity. It is tied to a geographic information system to display the location of pest activity and losses relative to key resource values. IPIAS is also linked to a data base management system so that appropriate resource data is accessible for analysis.

The structure of IPIAS is modular and consists of a series of independent models which are linked. This structure provides for flexibility because only those models which are appropriate for a specific area of land need be linked and used. In addition, the modular structure allows for insertion of new improved models which provide more realistic simulations, if and when they become available.

WHO ARE THE CUSTOMERS OF IPIAS?

Intermediate customers of IPIAS are resource specialists such as silviculturists, wildlife biologists, and pest management specialists who must assemble, analyze, and present data for decisionmaking. The ultimate customer is the line officer; the District Ranger, Forest Supervisor, Regional Forester, or their equivalent who must make resource management decisions based on the alternatives presented to them.

FOR WHAT AREAS OF LAND IS IPIAS APPLICABLE?

The smallest unit of land for which IPIAS analysis can be made is the stand. Stands with similar characteristics such as pest levels, age classes, or species composition can be aggregated into larger units such as compartments or ranger districts. The largest area of land to which IPIAS is applicable is a management unit such as a National Forest and intermingled lands of other ownerships.

FOR WHAT TIME PERIODS IS IPIAS APPLICABLE?

IPIAS analysis can be conducted for a rotation. Data can be displayed for a specified time interval such as every 10 years within a rotation. More detailed data can be obtained for a specific outbreak period. For these analyses, changes in pest levels and their effects on resource outputs can be displayed on a yearly basis.

WHAT IS THE PRESENT STAGE OF DEVELOPMENT OF IPIAS?

A prototype of the IPIAS concept was developed in 1981 for a portion of the Pike National Forest in Colorado. This system was developed to assess impacts of mountain pine beetle in ponderosa pine forests. Resource values for which models were linked include timber, recreation, scenic beauty, and the impact of tree losses on property values in forested communities. This system is now being used to plan timber harvesting in areas affected by a mountain pine beetle outbreak which occurred on the forest from 1979 to 1982.

A five-year program was begun in 1982 to expand this concept to lodgepole pine forests in the western United States threatened by the mountain pine beetle. A number of cooperators are involved in this program, including the Forest Pest Management - Methods Application Group, the Intermountain Forest and Range Experiment Station, the Western Energy Land Use Team of the U.S. Fish and Wildlife Service, the University of Arizona, and Virginia Polytechnic Institute and State University.

This program includes a pilot project to test and demonstrate this approach on the Nezperce National Forest in Idaho where the mountain pine beetle is beginning to reach epidemic levels. Some of the key resource values to be assessed with this version of IPIAS include timber, wildlife, and fisheries. Of special interest to the forest is the effect of mountain pine beetle and alternative management tactics on stream sedimentation and water quality.

WHAT ARE THE EXPECTATIONS OF IPIAS?

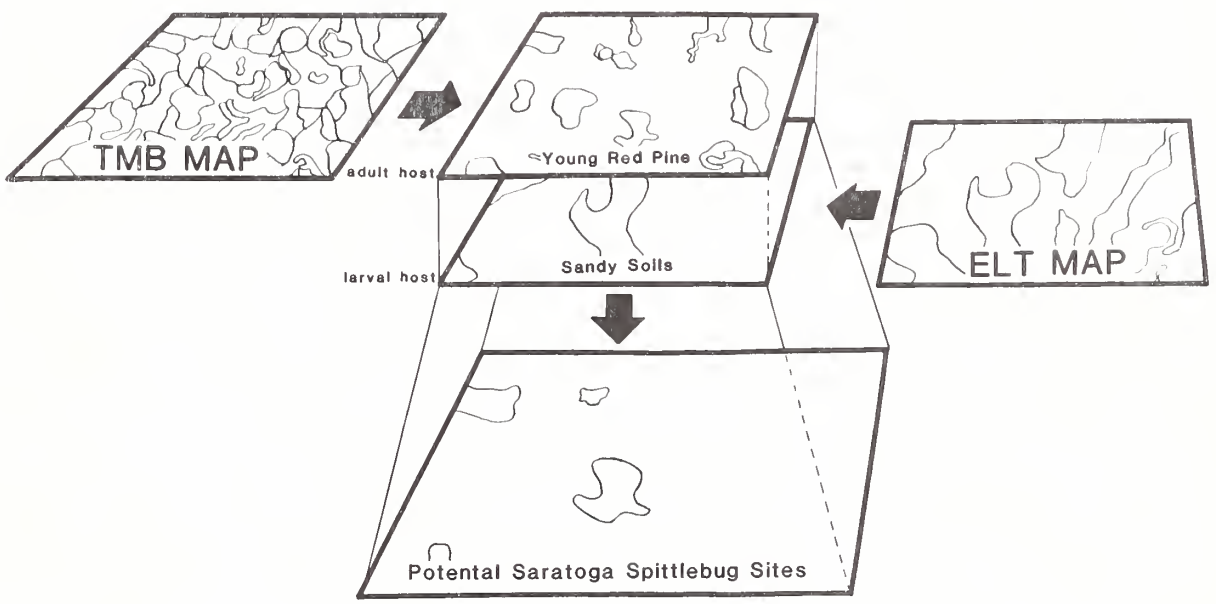
We believe that IPIAS is a concept which has sufficient flexibility to ultimately apply to any pest or pest complex on any forest ecosystem in North America. The primary requirement for its use is a good understanding of how these effects in turn impact the various mix of resource values for which that area is being managed.

INTEGRATING PEST AND RESOURCE DATA

Two years ago, personnel of the Nicolet National Forest in Wisconsin initiated the development of a spatial data base using the geographic information system, MOSS. This system was developed by the Western Energy Land Use Team of the U.S. Fish and Wildlife Service.

A cooperative project is now underway with the University of Minnesota to integrate forest pest data into this data base. This work is being done by Dr. Bruce Morse and Dr. Herbert Kuhlman of the Department of Entomology.

When completed the new data layers will provide a permanent, readily accessible record of the location of major pest activity on the forest. In addition, special analyses will be performed to risk rate stands for their susceptiability to certain pests such as the Saratoga



Conceptual model for identifying and locating stands susceptible to the Saratoga spittlebug using the MOSS geographic information system.

Young red pine and sandy soils are selected by MOSS from the TMB map (Timber Stand) and the ELT Map, (Ecological Land Types), respectively. These two selected maps are then overlaid by MOSS to produce a final map locating stands with a high risk to the Saratoga spittlebug.

spittlebug, a pest of young red pine. Young red pine are selected from the timber stand theme (TMB); in addition, ecological land types (ELT) associated with sandy soils are selected. Sweetfern, the alternate host for nymphal Saratoga spittlebug, commonly occur on sandy sites. The two selected maps are then overlaid to create a composite map which shows young red pine stands growing on sandy soils. These stands have the highest risk of Saratoga spittlebug infestations. The locations of these high risk stands is important information for planning survey and control operations for this important forest pest.

Similar map manipulations using MOSS will be performed to risk rate for the spruce budworm, white trunk rot of aspen, and white pine blister rust. Communications through the Data General network will link the timber management information system (TMIS), residing on the S2K data base in Fort Collins, with MOSS to help integrate forest pest management concerns into forest management activities.

SURVEY OF LARCH CANKER IN MAINE

Forest Pest Management specialists in Maine have recently discovered a new pest, caused by the larch canker which is caused by the fungus Dasyscypha willkommii. This fungus is a native of Europe which was introduced earlier into Massachusetts. In order to conduct an intensive ground survey to locate stands infected with this canker, the location of all larch stands was

Black and white reproduction (scale 1:16,000) of a portion of a 1:24,000 color infrared photo. Larch with fall coloration (L) shows as white trees. Other species are green conifers (C) and bare hardwoods (H).

needed. This information was not available, therefore an aerial photo survey was designed for locating and mapping larch stands in the southeastern portion of the state. This was a cooperative effort between the Northeastern Area FPM Field Office at Durham, New Hampshire; the Maine Forest Service, Augusta, Maine; and MAG.

The photo mission was designed to acquire 9 x 9 inch color infrared aerial photography at a scale of 1:24,000. The timing of photo acquisition was critical in order to separate larch from other conifers. Larch is a deciduous conifer and its foliage turns bright yellow in autumn. By acquiring aerial photos in October and early November, larch can be easily separated from other conifers such as fir, hemlock, and spruce. This would be impossible during the summer months without tedious interpretation of large scale photos. Photography had to be timed to allow hardwoods such as aspen and birch (also yellow or orange in color) to drop their leaves while the larch still retained their needles. The fall coloration of the larch foliage appears as white on color infrared photos while other conifers are a dark red and hardwoods appear a grayish color.

A group of Maine Forest Service personnel was trained by FPM to do the photo interpretation. Based on the data obtained from the photo interpretation, a ground survey will be conducted to determine where in Maine larch canker occurs and to what extent it is affecting this species.

TRACKING THE TUSSOCK MOTH

One of the most promising tools Forest Pest Management acquired as a result of the USDA Douglas-Fir Tussock Moth Expanded Research and Development Program was a detection system which uses a synthetically produced female sex attractant. Sticky traps, containing a minute quantity of attractant, are placed in areas susceptible to this destructive forest defoliator. If more than 25 moths are caught per trap, it serves as an early warning that populations may be on the increase. It is hoped that increases can be detected as early as two years before visible defoliation occurs.

This trapping system has been used westwide since 1980. Traps are manufactured by MAG through a contract with the Larimer County Rehabilitation Center and the attractant is provided by scientists at the Pacific Northwest Forest and Range Experiment Station.

With five years of data behind us, a group of pest management specialists met recently in Missoula, Montana, to review the effectiveness of the early warning system. Since its inception, localized tussock moth outbreaks have occurred in Northeastern Washington and Southwestern Idaho. The traps did provide some early warning that tussock moth populations were increasing in these areas. In 1984 significant increases in trap catches occurred in Northern Idaho in an area where tussock moth outbreaks occur regularly at 7 to 12 year intervals and over a large area of northern and central California. As a result of the trapping, entomologists plan to

increase monitoring of tussock moth larvae in these areas this year. The trap results may provide the opportunity to plan for suppression of outbreaks well in advance of the appearance of visible feeding injury. In addition, if these outbreaks materialize, it will provide an opportunity to refine the design of surveys using these traps, and to determine if 25 moths, or some other number, is the best indicator of an increase in tussock moth population levels.

GEOGRAPHIC INFORMATION SYSTEM TRAINING

During the past three years, ever since MAG has been in Fort Collins, we have been working closely with the Western Energy Land Use Team (WELUT) of the U.S. Fish and Wildlife Service, also located in Fort Collins. This team has developed a Geographic Information System known as the Map Overlay Statistical System (MOSS). This system is available in the public domain and is being widely

A Douglas-fir tussock moth trap, baited with the female sex attractant, in place in a Douglas-fir.

used by a number of federal resource management agencies. Our interest has been in the use of a system such as this for storage, display, and analysis of forest pest data and to integrate pest data with other resource data for impact analysis. We have conducted several demonstrations with this in mind.

One of the services WELUT provides is training in the use of Geographic Information Systems. In recognition of the interest Forest Pest Management has shown in this technology, WELUT sponsored a special training session, which emphasized forest pest management applications of GIS, during February. The workshop was attended by 16 eager-to-learn individuals; a full booking for this type of workshop.

Participants had an opportunity to gain first hand experience with the operation of computer terminals to access the MOSS software. Specific problems, designed around forest pest management application, required participants to formulate alternative management actions using various geographic data themes. These problems could be solved in a matter of minutes or hours. Presently, the solution to these types of problems would require days of tedious map overlay work.

Since this workshop dealt specifically with the use of Geographic Information Systems in Forest Pest Management, data bases recently developed by the Forest Service were used. These included geographic data bases for the Nicolet National Forest in Wisconsin, and for Mifflin County, Pennsylvania, where two years of data on epidemic gypsy moth population has been digitized and stored.

The class ended with the students using their newly acquired skills to develop a pest management plan for the gypsy moth in a portion of Mifflin County.

Left to right - Wayne Bousfield, Northern Region; Nick Crookston, Intermountain Forest and Range Experiment Station; and John Dale, California Region, examine pest management alternatives for gypsy moth using the Geographic Information System, MOSS.

PUBLICATIONS

Ciesla, W.M. 1983. Panoramic aerial photography in forest pest management. In Proceedings of the Damage Assessment Working Group Canusa Spruce Budworm Program, Bangor, ME, October 25-26, 1983.

Ciesla, W.M., C.W. Dull, E.T. Wilson, and P.A. Mistretta. 1984. Panoramic aerial photography for detection of oak decline and mortality in central Texas. USDA Forest Service, FPM/MAG, Fort Collins, CO. Rpt. No. 85-1.

Marsden, M.A., D.B. Cahill, and R.L. Livingston. 1985. An evaluation of four years of western spruce budworm population monitoring following a 1979 Idaho spray project. USDA Forest Service, FPM/MAG, Fort Collins, CO. Rpt. No. 85-3.

Munson, A.S., W.B. White, R.J. Myhre, and W.H. Hoskins. 1985. Evaluation of three survey methods for determining spruce-fir mortality caused by eastern spruce budworm. USDA Forest Service, FPM/MAG, Fort Collins, CO. Rpt. No. 85-2.

ACTIVITIES

Dick Myhre gave a seminar on the use of aerial photography for forest insect problems at the University of Minnesota on February 5. The following day he lead a discussion group of entomology graduate students on the topic of practical applications of aerial photography for entomology problems.

Bill Ciesla and Dick Myhre have been guest lecturers in the remote sensing course, at Colorado State University.

Mention of commercial products does not imply endorsement by USDA.

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